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EXAMINER	
ROSARIO, DENNIS	

ART UNIT	PAPER NUMBER
2624	

DATE MAILED: 10/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	10/009,790	GEUSEBROEK, JAN-MARK	
	Examiner	Art Unit	
	Dennis Rosario	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *interview summary 9/14/2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Interview Summary

1. The interview summary was entered on 9/14/2006. Claims 1-28 are pending.

2. The interview summary stated:

"Disscussed step 2 of claim 1 includes a digital gradient filter which operates to obtain a focus score for the image and to perform a smoothing operation having a settable spatial extent. Agreed to withdraw the rejection of claims 3,13 and 24 in view of the prior art discussed."

Regarding the first sentence; thus, claim 1, step 2 was reconsidered in view of Ortyn et al. (US Patent 5,841,124 A1) in light of a digital gradient filter (or "a filter array" in col. 19, line 53) which operates (using "finite impulse response, low pass filtering" in col. 19, lines 56,57 which is interpreted as the claimed step 2) to obtain a focus score (or "array of focus scores" in col. 20, line 62) for the image and to perform a smoothing operation ("low pass filtering" in col. 19, line 57) having a settable spatial extent (or "designed to be sensitive to the size" in col. 19, line 58 while the impulse response filter is designed to "eliminate...the first and last few elements" in col. 19, lines 61,62).

The examiner recalls from the interview that the claimed digital gradient filter is used to obtain a focus score and is integrated with a smoothing operation that are performed together which corresponds to a "combined gradient and smoothing operator which carries out both gradient and smoothing operations in one pass" in the specification, page 11, lines 19,20. While such a feature such as the "combined gradient and smoothing operator which carries out both...operations in one pass" are not claimed (see "Note" below), the examiner interprets the above mentioned filter array as the above mentioned combined gradient and smoothing operator; however, Ortyn et al. is not clear as to whether the filter array carries out both operations in one pass. However, the examiner believes that Ortyn et al. suggests such a feature since an array of filters is used where one filter of the array can operate or a plurality of filters can operate simultaneously or a patterned sequence of filters can operate in a certain order.

Note that the claimed step 2 is interpreted as "applying (as claimed in claim 1, line 5)" the digital gradient filter and does not apply the claimed smoothing operator within step 2. Thus, only the digital gradient filter operation is only carried out in one pass and includes an inactive or not applied smoothing operation during step 2 which is interpreted as one pass.

Regarding the second sentence from the interview summary, a new search for claims 3,13 and 24 was conducted which resulted in a new grounds of rejection under Hartman (US Patent 4,592,089 A).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1,2,4-12,14-20,22,23 and 25-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Ortyn et al. (US Patent 5,841,124 A).

Regarding claim 1, Ortyn et al. discloses a method of autofocus of an optical instrument for viewing an object and having an auto-focusing mechanism, comprising the steps of:

Step 1: acquiring a first digital image (fig. 14, num. 316 receives an image via arrow 310) of the object (Oval shape next to numeral 508.) through the optical instrument (Fig. 14, num. 302 has magnification modes), the first digital image (fig. 14, num. 316) comprising a plurality of pixels having pixel values (The first image is formed from a CCD array of a camera as mentioned in col. 17, lines 48-52.);

Step 2: applying a digital gradient filter ("spectral filter" in col. 19, line 27) to at least some of the pixel values of the first digital image to obtain a focus score (Fig. 13:"FOCUS SCORE") for the first digital image; wherein the digital gradient filtering step includes a smoothing operation (or a "transformation" in col. 19, line 21 from fig. 20 to fig. 21) having a settable spatial extent (Fig. 20, "a" or "b" corresponds to distances that are set using a "size range" in col. 19, line 1.) **(see paragraph 2, "Regarding the first sentence" for another interpretation of the claimed step 2)**.

Regarding claim 2, Ortyn discloses the method of claim 1, wherein the spatial extent (Fig. 20, “a” or “b” distance or range is selected filtering as mentioned in col. 19, lines 21-28.) of the smoothing function (“low pass filtering” is used with the filter 540 of fig. 14. as mentioned in col. 19, line 57.) is manually and/or electronically settable (The spatial extent or range is “designed using conventional techniques” in col. 19 , lines 33-36).

Regarding claim 4, Ortyn et al. discloses the method according to claim 1, further comprising:

Step 3: moving the object (Oval shape next to numeral 508 is placed on a slide that is moved for each image signal as mentioned in col. 22, lines 8-14.) relative to the optical instrument (Fig. 14, num. 302 has magnification modes) along the optical axis (Fig. 14 has an optical axis shown by an arrow 110 and another arrow going out of 302.) thereof and acquiring a second digital image (Fig. 14, num. 316 is a camera as mentioned in col. 17, line 63) and a second focus score therefor (The camera of fig. 14, num. 318 is a focus minus camera that obtains focus scores shown in fig. 13 as the F^- curve.) in accordance with the method of steps 1 and 2 (The method of steps 1 and 2 are repeated for additional images of step 3.) ;

Step 4: continue moving the object (Oval shape next to numeral 508 is placed on a slide that is moved for each image signal as mentioned in col. 22, lines 8-14.) relative to the optical instrument (Fig. 14, num. 302 has magnification modes) along the optical axis thereof (Fig. 14 has an optical axis shown by an arrow 110 and another arrow going out of 302.) in the same direction in accordance with steps 1 to 3 to acquire at least three digital images (Fig. 14, numerals 314-318 are three cameras that obtains 1 image each for a total of three images as mentioned from col. 17, line 48 to col. 18, line 5.) and first to third focus scores (fig. 13 as three functions that correspond to the three images which each contain a respective focus score.) associated therewith; and

Step 5: determining from the first to third focus scores (fig. 13 as three functions that correspond to the three images which each contain a respective focus score.) a focus position ("0" on the Z POSITION OF SPECIMEN axis is a focused position as mentioned in col. 16, lines 64-66. Note the "0" position corresponds to two focus signals that are "equal" to each other as mentioned in col. 16, line 66.) for the object (Oval shape next to numeral 508) and moving (The oval shape, which is on a slide, is moved for proper focusing as mentioned from col. 16, lines 62 to col. 17, line 4.) the object (Oval shape next to numeral 508) and/or the optical instrument to this position (Fig. 14, num. 302 has magnification modes).

Claim 5 is similar to claim 4, except for step 3 that is disclosed by Ortyn et al.:

Step 3: determining (Normalizing a function F^- to determine corresponding normalized focus scores.) a first plurality of focus scores (Fig. 13 has a plurality of focus scores for a function F^-.) for the first digital image (fig. 14, num. 316) using the digital gradient filter (Fig. 14, num. 540 has a filter, which is shown in detail in fig. 15, num. 404 which produces the score shown in fig. 13) with a first plurality of spatial extents (The F^- has a plurality of spatial extents as shown by each position from –15 to +15) by applying (The method of steps 1 and 2 are performed for one image to obtain 256 focus minus scores as mentioned in col. 18, lines 32-34.) for each spatial extent (-15 to +15 or 30 spatial extents) the method steps 1 and 2.

Regarding claim 6, Ortyn et al. discloses the method according to claim 1, wherein the optical instrument is a microscope (Fig. 2, num. 510 is a microscope.)

Regarding claim 8, Ortyn et al. discloses the method according to claim 1, wherein the digital filtering function ("low pass filtering" is used with the filter 540 of fig. 14. as mentioned in col. 19, line 57.) is a one (Fig. 13 shows a function that corresponds to the filtering of fig. 14, num. 540 that has one dimension in the "Z POSITION".) or two dimensional function.

Regarding claim 9, Ortyn et al. discloses the method according to claim 1, wherein the digital filtering function ("low pass filtering" is used with the filter 540 of fig. 14. as mentioned in col. 19, line 57.) is a Gaussian function (Fig. 13 shows a normalized function with triangle marks and a corresponding equation in figure 13 that is mentioned in col. 21, lines 1-6 that corresponds to the filtering of fig. 14, num. 540. Note that the specification states that a Gaussian function is "normal Gaussian curve" on page 12, line 2. Thus the normalized function with triangle marks in fig. 13 is a normal Gaussian curve.)

Regarding claim 10, Ortyn et al. discloses the method according to claim1, further comprising the step of selecting the spatial extent (Fig. 20, "a" or "b" distance is selective filtering as mentioned in col. 19, lines 21-28.). of the digital filtering function ("low pass filtering" is used with the filter 540 of fig. 14. as mentioned in col. 19, line 57.).

Claim 11 is rejected the same as claim 1. Thus, argument similar to that presented above for claim 1 of a method is equally applicable to claim 11 of an instrument except for the additional limitation of an auto-focusing mechanism which is disclosed in Ortyn et al.: "autofocus system" in col. 15, line 58.

Claim 12 was addressed in claim 2.

Regarding claim 14, Ortyn et al. discloses the optical instrument according to claim 11, further comprising:

a drive device (fig. 1A, num. 526:MOTOR DRIVERS) for moving the object (fig. 16) relative to the optical instrument (fig. 1A, num. 516:IMAGE CAPTURE & FOCUS (ICF)) along the optical axis thereof (fig. 2 is a detail of the ICF of fig. 1A, num. 516 that has an optical axis 110).

Regarding claim 15, Ortyn et al. discloses the optical instrument (fig. 1A, num. 516:IMAGE CAPTURE & FOCUS (ICF)) according to claim 11, the instrument being further adapted for determining from a plurality of focus scores (Fig. 13 has a plurality of focus scores on a vertical axis for three functions, F^-, F^+ and F) for a plurality of images (F^-, F^+ corresponds to two images) a focus position for the object (The function F is the final focused image based on the other two functions).

Regarding claim 16,Ortyn et al. discloses the optical instrument according to claim 15 further adapted for fitting ("normalized" functions of fig. 13 are adjusted to fit in a score range on the vertical axis.) the plurality of focus scores (Fig. 13 has a plurality of focus scores on a vertical axis for three functions, F^-, F^+ and F) to a polynomial function (The function of fig. 133 with square marks.) and determining the focus position (-5 on the Z POSITION AXIS) as a position to a maximum (-5 of the Z POSITION AXIS corresponds to a maximum score of 1 on the vertical axis.) of the polynomial function (The function of fig. 13 with square marks.)

Regarding claim 17, Ortyn et al. discloses the optical instrument (Fig. 1A, num. 516:IMAGE CAPTURE & FOCUS (ICF)) according to claim 15, the instrument being adapted to determine for each image a plurality of focus scores (Fig. 13 has a plurality of focus scores on a vertical axis for three functions, F^-, F^+ and F that correspond to three images.) using a plurality of spatial extents (The function of F^- and F^+ each have a range from –15 to +15 on the Z POSITION OF SPCIMEN axis.) for the digital filter (Fig. 14, num. 540 has a filter shown in detail in fig. 15).

Claims 18 and 25 were addressed in claim 8.

Claims 19 and 26 were addressed in claim 9.

Claim 20 was addressed in claim 6.

Claim 23 was addressed in claim 12.

Claim 22 was addressed in claim 11.

Claim 27 was addressed in claim 15.

Claim 28 was addressed in claim 16.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3,13,21 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ortyn et al. (US Patent 5,841,124 A) in view of Hartman (US Patent 4,592,089 A).

Regarding claim 3, Ortyn et al. teaches a method of autofocus for an optical instrument for viewing an object and having an auto-focusing mechanism, comprising the steps of:

Step 1: acquiring a first digital image (fig. 14, num. 316 receives an image via arrow 310) of the object (Oval shape next to numeral 508.) through the optical instrument (Fig. 14, 302 has magnification modes), the first digital image (fig. 14, num. 316) comprising a plurality of pixels having pixel values (The first image is formed from a CCD array of a camera as mentioned in col. 17, lines 48-52.);

Step 2: applying a digital filter ("or filter array" in col. 19, line 53) to at least some of the pixel values of the first digital image to obtain a focus score (Fig. 13:"FOCUS SCORE") for the first digital image; wherein the digital filter is defined by a mathematical smoothing function (or "low pass filter" in col. 19, lines 54,55 that is one component of the filter array)

Ortyn et al. does not teach the remaining limitations, but teaches that the low pass filter can be "designed to be sensitive...to size" in col. 19, line 58. Thus, Ortyn et al. suggests to one of ordinary skill in the art a plurality of teachings that can used to create the low pass filter.

Hartman teaches a low pass filter or "median filtering" in col. 11, line 39 that "removes high-frequency" in col. 11, line 39 or "point noise without boundary smoothing" or "spot radii" in column 8, TABLE II, labels MEDSM and RADFLT that is sensitive to size or a "radius" in col. 11, line 41. Thus, the median filter is interpreted to remove the point noise via a smoothing operation and retain the boundary by not smoothing or removing the boundary) that could be used during the design of the low pass filter and the remaining limitation of:

a) a mathematical smoothing function (or "median filtering" in col. 11, line 39 as shown in column 8,TABLE II, label: MEDSM and RADFLT) having a negative and positive lobe around the origin thereof (via a differential in table II, label: CSDIF that includes an "origin" in col. 10 10, line 33 as shown in fig. 10), the mathematical smoothing function having only one zero crossing (as shown n fig. 10) and being limited in spatial extent (as shown in fig. 3,num. 45) in that it extends over a distance equal to the image size and extends (as shown in fig. 10 to the left and right towards the horizontal axis) at least over three pixels either side of a pixel whose value is being filtered (since fig. 3,num. 45 is a 60 x 60 window in TABLE II, label: WINDIN).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Hartman's teaching of median filtering with Ortyn et al.'s teaching of a low pass filter, because Hartman's median filter removes "high frequency- and spurri-ous…irregularities" in col. 11, lines 39,40.

Claims 13 and 24 are rejected the same as claim 3. Thus, argument similar to that presented above for claim 3 of a method is equally applicable to claims 13 and 24 of a mechanism.

Claim 21 is rejected the same as claim 12. Thus, argument similar to that presented above for claim 12 is equally applicable to claim 21.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Mansour et al. (US Patent 3,883,689 A) is pertinent as teaching a positive and negative lobes as shown in fig. 5 corresponding to lowpass filters as shown in fig. 2,num. 48. However, Mansour et al. invention does not appear to have the claimed digital image.

Liptay-Wagner et al. (US Patent 4,394,683 A) is pertinent as teaching a method of smoothing as shown in fig. 3b relative to fig. 3a and obtaining a second derivative that corresponds to the claimed positive and negative lobes; however, the claimed origin is not disclosed with respect to fig. 3d.

Yoneyama (US Patent 6,128,129 A) is pertinent as teaching the claimed negative and positive lobes as shown in fig. 3B, however the lobes are a function of STAGE POSITION and CONTRAST VALUE while the claimed lobes are a function of pixel position. The relationship between the stage position and the claimed pixel position is not clear.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario whose telephone number is (571) 272-7397. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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